extraordinary amount of energy (theoretically capable of exerting $\frac{623}{42·7}$ = 14·5 horse-power) is called forth by the moderate differential temperature of 212° – 102·56° = 109·44° F. Now, let us compare the energy of 623 thermal units per minute to that produced by the radiation of a metallic surface coated with lamp black, and maintained at a temperature of 212°, within an enclosure of 102°. Actual trial shows that under these conditions, the radiant energy of a blackened plate composed of copper, containing 144 sq. inches, scarcely reaches 6 thermal units per minute. Our experiment has therefore established the fact, incidentally, that under the stated conditions, a plate of wrought copper two inches in thickness is capable of transmitting by conduction from one side to the other, in a given time, an amount of mechanical energy more than 100 times greater than the mechanical energy developed by the radiation of the same plate during an equal interval of time.

TABLE I.—COPPER COLUMN

TIME.	Temperature of Water in Cistern.	Increment of Temperature in Cistern.	Energy Transmitted past *k l*.	Differential Temperature Between Boiler and Cistern.	Energy Transmitted past *k l* per Half-minute.	Energy Transmitted per Square Foot per Half-minute.
Min.	Fah. °	Fah. °	Therm. Units.	Fah. °	Therm. Units.	Therm. Units.
	73·50			138·50		
0·5	75·15	1·65	0·143	136·85	0·143	104·873
1·0	77·25	3·75	0·326	134·75	0·183	134·208
1·5	80·14	6·64	0·577	131·80	0·251	184·078
2·0	83·84	10·34	0·898	128·10	0·321	235·415
2·5	88·14	14·64	1·272	123·80	0·374	274·284
3·0	92·81	19·31	1·678	119·00	0·406	297·752
3·5	97·67	24·17	2·100	114·25	0·422	309·486
4·0	102·56	29·06	2·525	109·44	0·425	311·686

TABLE II.—MERCURIAL COLUMN

TIME.	Temperature of Water in Cistern.	Increment of Temperature in Cistern.	Energy Transmitted past *m n*.	Differential Temperature Between Boiler and Cistern.	Energy Transmitted past *m n* per Half-minute.	Energy Transmitted per Square Foot per Half-minute.
Min.	Fah. °	Fah. °	Therm. Units.	Fah. °	Therm. Units.	Therm. Units.
	73·50			138·50		
0·5	73·52	0·02	0·002	138·48	0·002	1·466
1·0	73·56	0·06	0·005	138·44	0·003	2·200
1·5	73·64	0·14	0·012	138·36	0·007	5·133
2·0	73·75	0·25	0·022	138·25	0·010	7·334
2·5	73·90	0·40	0·035	138·10	0·013	9·534
3·0	74·08	0·58	0·051	137·92	0·016	11·734
3·5	74·28	0·78	0·068	137·72	0·017	12·467
4·0	74·50	1·00	0·087	137·50	0·019	13·934

J. ERICSSON

NOTES

THE voluminous correspondence connected with the management of Kew Gardens, printed by order of Parliament, was issued at the close of last week. In the debate in the House of Lords on Monday, introduced by Lord Derby, the essential points of the controversy were hardly touched; and pending the debate in the House of Commons on Sir John Lubbock's motion, which was not reached on Tuesday evening, it is obviously premature to enter into the various discussions which are prompted by the contents of the Parliamentary papers.

THE choice of a foreign correspondent of the French *Académie des Sciences* has resulted in the defeat of Mr. Darwin and the election of M. Loewen, of Stockholm, who received 32 votes, against 15 given to the English naturalist. The discussion had extended over three long sittings in secret committee, the leader of the advocates of Mr. Darwin's claim being again his opponent in controversy, M. de Quatrefages, while M. Emile Blanchard led the opposition. A correspondent of *Les Mondes*, an eminent member of the Academy, in commenting on the result, states that not one of those who voted for Mr. Darwin shared his philosophical doctrines, and not one of those who opposed his candidature alleged as their motive the error or danger of his doctrines. "What has closed the door of the Academy to Mr. Darwin is that the science of those of his books which have made his chief title to fame—the 'Origin of Species,' and still more the 'Descent of Man'—is not science, but a mass of assertions and absolutely gratuitous hypotheses, often evidently fallacious. This kind of publication and these theories are a bad example, which a body that respects itself cannot encourage."

THE subject of Prof. W. K. Clifford's discourse at the ensuing meeting of the British Association will be, "The Aims and Instruments of Scientific Thought." Mr. W. Spottiswoode will deliver a lecture to working men, on "Some Properties of Light, Sunshine, Sea, and Sky."

THE Iron and Steel Institute will hold its next meeting in Glasgow, under the presidency of Mr. Henry Bessemer. The reception room will be in the Corporation Galleries, Sauchiehall Street. The general meetings will be held in the Lecture Hall, Corporation Galleries, Sauchiehall Street, as under:—Tuesday, Aug. 6, 1.30 P.M., Election of Members, Report of Council to be presented, Papers; Wednesday, Aug. 7, 10.30 A.M., Reading and Discussion of Papers; Thursday, Aug. 8, 10.30 A.M., Reading and Discussion of Papers. A room will be provided in the Corporation Galleries for the exhibition of objects of interest to the trade, either from the neighbourhood of Glasgow or elsewhere. The business proceedings will terminate about 3 o'clock on Tuesday, and it is proposed that members should devote the remainder of the day to visiting the iron and other works in the neighbourhood of Glasgow. A list of these works will be given in the detailed programme to be distributed at the meeting; and a sketch map of the district will also be ready at the same time. On Wednesday, immediately after the conclusion of the business meeting, a special train will be provided to convey the members to Coatbridge and Monkland, where the Gartsherrie, Summerlee, Langloan, Coatbridge, Malleable, and Monkland Iron Works will be inspected. On Thursday, after the conclusion of the general meeting in Glasgow, a special train will be arranged for the Motherwell district, and for the inspection of the iron works in that locality. On Thursday evening, at 7 o'clock, the members will be entertained at dinner, in the Corporation Galleries, Glasgow, by the Local Reception Committee. On Friday an excursion will be made down the Clyde, for the purpose of seeing the industrial features connected with the river. The excursion will also be prolonged to the head of Loch Long, the return being by Loch Lomond to Balloch, and thence by train to Glasgow. Luncheon will be provided at Tarbet. The following papers have been already promised:—"On the Geological Features of the Iron and Coal Districts of Scotland," by Mr. James Geikie, F.G.S., of the Geological Survey of Scotland; "On the Rise and Progress of the Iron Trade in Scotland," by Mr. Jno. Mayer, F.C.S., Glasgow; "On the Differential Clutch for Reversing Mills," by Mr. R. D. Napier, Glasgow; "On Reversing of Rolling Mills," by Mr. Graham Stevenson Airdrie; "On an improved form of Squeezer for Blooms produced in

Rotary Puddling Furnaces," by Mr. James Robertson, Glasgow; "On the Rise of Iron Steamship Building on the Clyde;" "On further Improvements in Spencer's Revolving Puddling Machine," by Mr. Adam Spencer, West Hartlepool; "On the Westward Development of the Iron Manufacture in the United States," by Mr. T. Guilford Smith, Philadelphia.

THE Annual Meeting of the Association of German Naturalists and Physicians will be held at Leipzig, from Aug. 12 to Aug. 18.

A MATHEMATICAL society of Paris has been formed, on the plan of the similar societies of London, Moscow, and Berlin, having for its object to encourage mathematical studies and increase mathematical knowledge, and to form a bond of union of those interested in the mathematical sciences. Among its original members are MM. Chasles, Serret, Ossian Bonnet, Resal, Bourget, Mannheim, Laurent, Halphen, de Polignac, Ribeaucourt, Lemoine, Laguerre, Gros, Brisse, and André. The Society proposes publishing a *Bulletin* of its Proceedings.

WE regret to learn that Prof. H. E. Roscoe is laid by from a serious accident—a kick from a horse. The injuries, however, we understand, are only such as complete rest will repair.

JUDGMENT has been given by Lord Gifford, in the Court of Session at Edinburgh, in favour of Miss Jex Blake and other lady students in their action against the Senatus Academicus, asserting their right to complete at the University their full medical curriculum, and to graduate on the same footing as male medical students. The judgment finds the ladies entitled to all the privileges of medical students, and to graduate in medicine at the University. The laws of Scotland, continues the judge, hardly as they bear against women in some respects, have never gone so far as to forbid their entering the medical profession.

WE are glad to observe that a movement which we noted in April last has succeeded in giving a well-earned reward to Mr. James Lindsay, Experimental Assistant to the Professors of Natural Philosophy in Edinburgh University for the last fifty-four years. A meeting was held in Edinburgh on the 24th, presided over by Prof. Sir R. Christison, Bart., M.D., who, in a few words, pointed out the great merit which had induced Mr. Lindsay's friends to present him with this manifestation of their respect, and gave a sketch of his long connection with the Natural Philosophy chair at the University. The subscriptions amounted in all to 235*l.*; the list of subscribers including the names of H.R.H. the Duke of Edinburgh, the Marquis of Tweeddale, the Duke of Argyll, Dr. Lyon Playfair, M.P., Mr. Carlyle, Prof. Tyndall, Prof. Sir R. Christison, Sir W. Thomson, W. M. Rankine, Tait, &c.

MR. J. LOWTHIAN BELL, of Newcastle-on-Tyne, has been elected an honorary member of the United States Mining and Engineering Institute, in recognition of his labours.

IT has been determined to erect a statue in Berlin to the memory of Albert von Graefe, the eminent oculist. The names of some of the most distinguished surgeons of Europe are on the committee.

WE understand that the Royal College of Chemistry will resume its operations at the commencement of the Autumn Term, in the new laboratories at South Kensington.

THE Museum at Thornhill, Dumfriesshire, is now open to the public on Saturdays from one o'clock. Admission will be by free tickets, which may be obtained by application at the museum, and a description will be given of some special class of objects. On other days of the week, Sunday excepted, admission will be by tickets for which the charge of sixpence will be made. To the museum will be added a small library of selected books, which may be had on loan; also a library of books for consultation at the museum. This library consists of about two thousand volumes. A few periodicals will also be added. A descriptive catalogue of the museum and a catalogue of the library are in preparation.

THE most recent publication of the Geological Survey consists of the explanation of quarter-sheet 98 S.E., illustrating the geology of the neighbourhood of Kirkby Lonsdale and Kendal, by Messrs. Aveline, Hughes, and Tiddeman. It contains the usual sketch of the physical geography of the district, and lists of the fossils of the various formations, and is illustrated by several sections.

MR. W. R. HAYWARD has in preparation a new work, which will be called "The Botanist's Pocket-Book." It is intended as a handy pocket companion for the botanist in the field, to enable him to identify on the spot the plants he may meet with in his researches. It will contain the characteristics of species and varieties, the botanical name, common name, soil, and situation, colour, growth, and time of flowering, of every plant, arranged under its own order. The volume will be published by Bell and Daldy, York Street, Covent Garden.

AN excellent compendium of our present knowledge of the sun and the phenomena of its atmosphere, from the pen of Prof. Young, has just been published by Chatfield and Co., of New Haven. This author, it is well known, has himself occupied a very prominent part in the history of more recent discoveries in regard to the sun, and the article referred to is the substance of a lecture delivered at New Haven during the past winter. This has, however, been materially modified, so as to bring the subject up to the present state of our knowledge, as rendered necessary by the rapid progress made in the science of solar physics.

IN the form of a 4to pamphlet is printed "Discussion of the anemometrical Results furnished by the Anemometer at Sandwick Manse, Orkney, 1863-1868, from the Appendix to the Quarterly Weather Report for 1871.

WE have received three papers by Prof. O. C. Marsh, on "The Discovery of Additional Remains of Pterosauria, and of the Dermal Scutes of Mosasauroid Reptiles;" "The Structure of the Skull and Limbs in Mosasauroid Reptiles," and a "Preliminary Description of Hesperornis Regalis." These have already been alluded to in our *résumé* of the contents of *Silliman's Journal.*

WE have a reprint from the *Geological Magazine* of Mr. James Geikie's valuable and interesting papers "On Changes of Climate during the Glacial Epoch." The author has made several additions and alterations, one of the most valuable additions being a summary of the general results arrived at in the memoir in a series of thirty-six short paragraphs.

THE *Notizblatt des Vereins für Erdkunde und verwandte Wissenschaften zu Darmstadt und des Mittelrheinischen Geologischen Vereins* for 1871 contains a host of valuable papers and statistical tables connected with all branches of geography—physical, political, and social, and the sciences connected therewith, especially meteorology and geology, relating to the Grand Duchy of Hesse-Darmstadt. We notice especially two very elaborately-constructed charts of the meteorological observations taken during the years 1870 and 1871.

THE *Chemical News* contains a paper by Mr. Hugo Tamm on "A Ferro-Tungstine, a New and Interesting Mineral," which Mr. Tamm desires to designate "Crookesite." This name, however, having been already appropriated, Mr. Crookes proposes that, when the missing constituent is discovered, it should be called "Tammite." Mr. Tamm's analysis of the new mineral gives:—Metallic Tungsten 88·05, Metallic Iron 5·60, Metallic Manganese 0·15, Undetermined Substance 6·20. Mr. Tamm ventures upon various conjectures as to this last substance, and thinks it just possible that, after all, he may have made an analytical error, and that there may be 6·2 per cent. more of tungsten than appears in the analysis. He has, however, strong doubts on this point.

REGARDING "sea-serpents," the following note may be interesting:—The South African Museum, Cape Town, recently received a specimen of the Ribbon fish (*Gymnoterus*) fifteen feet long without the tail. It appears that this fish is known to distant inland fishermen as being forty feet long, and from its slender shape and snake-like movement is probably the "sea serpent" of late years so minutely described by navigators. From its head there is erected a plume of flexible rose-coloured spines, and from head to tail along its back there is a conspicuous mane-like fin. Its general colour is like burnished silver. The eye is large and silvery, and the profile of the head comports well with that of the horse. The specimen could not be preserved, but there are two smaller specimens in the Museum.

THE *Garden* calls attention to the great value of the Island of Jamaica as a tropical garden. Its oranges, pine-apples, bananas, limes, lime-juice, cocoa-nuts, and other such products, could not be surpassed in quality, and might be cultivated to any imaginable extent. Besides all this, the soil and climate are eminently suitable to the growth of precious drugs and plants. Bark is raised easily, the cinchona plantation being in a most satisfactory state. Then there are hemp and China grass of excellent quality, nor would any arrowroot be superior to that of Jamaica if it were but more carefully prepared for market. Here, it will be said, is a noble prospect for the colony. True, but it is a prospect only. Not until the very last returns is there shown any "tendency to the development of new industries requiring little capital and no extraordinary skill." It is the old story, "minor articles" are neglected, though they are the very articles which are wanted, and which the colonists could send. However, Jamaica is fortunate in having a Governor in Sir J. P. Grant, who can discern the true capabilities of the island, and the true place for its industry in the markets of the world.

A CORRESPONDENT of the *Madras Mail*, quoted by the *Times of India*, says that on the night of June 15 last the plain to the east, north, and north-east of Nandidroog was covered with "many thousands" of lights, which have been observed occasionally in former years. The correspondent compares the appearance to that of a large city brilliantly illuminated, and in one direction the scene, through a binocular glass, "looked like a view of part of the starry heavens, each flame being like a star." As many of the lights were from ten to fifteen miles distant from the reporter's point of view, he conjectures that each flame must have been five to six feet in length. An attempt is being made to find out the cause of the curious phenomenon, the most likely hypothesis being that the lights are "caused by the ignition of some inflammable gas escaping in jets from the surface of the earth."

WE learn from the *Field* of July 20, that Mr. Parnaby has succeeded in bringing sixty black bass fry home from America, and that they are safely deposited in the tanks at Troutdale, Keswick, and are feeding heartily, so that they may now be considered safe. He found great difficulty in collecting the fry and bringing them safely across the Atlantic on account of the intense heat. Mr. Francis considers this the second greatest feat in pisciculture, the first being the conveyance of salmon to Australia.

PROFESSOR AGASSIZ'S SOUTH AMERICA EXPEDITION*

III.

IN Mayne Harbour, on the western side of Owen's Islands, I had an opportunity of investigating two very interesting new genera of naked-eyed Acalephs. The locality naturally suggested appropriate names, and I called one after Captain Mayne, *Crossotoca Maynei*, from the festooned disposition of the ovaries, and the other after my old friend Owen, *Staurotoca Owenii*, from the cross-like figure of the ovaries. While I was collecting on board, Pourtales and Steindachner ascended the adjoining hills in search of glacial marks and land animals. The result of their excursion was most satisfactory. Pourtales found very well preserved glacial scratches and furrows upon wide greenstone dykes, which here intersected the rocks in every direction. Upon one such ledge the marks were divided into two distinct series, one running S.W. by W., the other crossing these S.S.W. Higher up on other dykes of the same character, the first series of marks occurred again, being perfectly rectilinear, in the same direction, and though in one instance interrupted, were renewed on the other side of the break on the same level with the same bearing. Still higher up on the same hillside he found also very distinct glacial furrows upon granite ridges, the furrows bearing S.W. by S., and finer lines again on greenstone dykes. The highest marks in the locality were some 500 or 600 feet above the sea level. Steindachner collected frogs and their tadpoles, and some insects and earthworms.

On approaching the Guia Narrows, the hills on Chatham Island are plainly furrowed in a north-westerly direction, and large boulders are seen all along upon the ridge of the range, while Esperanza Island appears in the south like a large rounded dome between two channels running N. and S. In wide channels we saw many whales and also small icebergs. The hills to the height of about 2,000 feet were everywhere distinctly *moutonnées*. Saumarez Island, opposite the mouth of Eyre Sound, and the island to the west of it, were particularly instructive. We followed the western channel, which is also the narrowest, and it soon became plain that wherever opposite shores with high walls approached near one another the glacial scratches and furrows, alike distinct, assumed an ascending direction, as is the case whenever a moving glacier meets an obstacle. That the south side was here also everywhere the strike side, was equally apparent from the facts that all these marks were either wanting or less distinct on the north side of the islands. Had any abrading agent advanced from the North, all appearances must have been reversed in these narrow channels; or they must have crossed them at right angles had the action come from East or West. Floating ice is out of the question where the furrows are not horizontal, and here in the narrowest part of the channel, west of Saumarez Island, there is a track where the scratches and furrows are distinctly ascending on the west side of the channel, and horizontally on the eastern side opposite, showing that the pressure of the ice-sheet must have been from S.E. to N.W.

Looking south, after passing Saumarez Island, the scenery appears totally different, from the fact that this is the lee side of the glacier action; and yet the channels have about the same width and bear the same relations to one another. In the narrowest channels the polished surfaces, with their scratches and furrows, are as well preserved and as distinct as in those of the Helle Platten at the Handeck in the valley of the Hassli in Switzerland. About Iceberg Sound all the mountains are beautifully rounded and *moutonnées*. That local glaciers, however, existed, and extended much beyond their present range, may be plainly seen in many of the inlets crossing the main channels in an east-westerly and west-easterly direction. It is true that general and local glacial phenomena are so interwoven throughout this region that it is at times difficult to appreciate their true connection; but there are also many localities where the difference is quite obvious. The most interesting of the places here have been well photographed by Dr. White, and may serve at some future time as illustrations of the fact described in this report.

In some places the various kinds of glacial marks were as plain as in the valleys of Switzerland, and I am surprised that travellers who have visited this region since the glacial phenomena have been so much discussed, have failed to notice them here. As in Switzerland, there seems to be a level above which the ice-sheet has never risen; at least there is a line above which the mountain ridges remain jagged and abrupt, while

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* Reprinted from the *New York Tribune*, concluded from p. 231.